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Illinois Sand Prairies

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A New Frog and a New Turtle from the Western Illinois Sand Prairies

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The accumulation of herpetological specimens, resulting from field work in Illinois over the past four years, has led to a preliminary analysis of distribution of the herpetofauna and the relationships of eastern and western elements within the state. The intermediate position of Illinois between eastern deciduous forest and central plains, the interdigitation of prairie and woodland over most of the state, and the presence of isolated sand prairies which closely resemble habitats found in the Great Plains are reflected by more than a quarter of the Illinois species and subspecies. Each of these 28 forms either has a subspecific break or reaches the eastern or western limit of its range in this ecotone.

Among the more striking examples of western elements in the Illinois herpetofauna are those animals with distinct discontinuity of range; in some cases the hiatus between Illinois and Great Plains populations is three to four hundred miles. These extremes are species believed to be restricted in eastern distribution to the sand prairies of northern and western Illinois. Two of these, a chorus frog and a mud turtle, differ subspecifically from the Great Plains populations and are described herein.

I am indebted to Robert W. Reese, Paul W. Parmalee, and Louis W. Ramsey for their kindness in supplying living material for comparative purposes; to Ottys Sanders, Clifford H. Pope, Donald F. Hoffmeister, and Mr. Ramsey for the loan of preserved specimens in their personal collections or in their charge. Mr. Sanders generously transcribed detailed color notes of Texas *Pseudacris streckeri* from his field notes and made these available to me. W. Leslie Burger and William B. Robertson kindly took measurements for me on specimens at other institutions. Drs. Hobart M. Smith and Herbert H. Ross have given advice and encouragement on numerous occasions, and both have my gratitude for their assistance in the preparation of this manuscript.

Museums cited are abbreviated as follows: **INHS**, Illinois Natural History Survey; **UIMNH**, University of Illinois Museum of Natural History; **CNHM**, Chicago Natural History Museum; **CA**, Chicago Academy of Sciences; **UMMZ**, University of Michigan Museum of Zoology, and **USNM**, United States National Museum.

Pseudacris streckeri illinoensis, new subspecies

Plate 1

Pseudacris brachyphona (nec Cope), Weed, Copeia, no. 116, p. 49, 1923. Misidentification.

Pseudacris sp., Walker, Ohio Journ. Sci., vol. 32, no. 4, p. 382, 1932. Listed as "not *brachyphona*."

Holotype. **INHS 5982**, male from three miles north of Meredosia, Morgan County, Illinois, collected May 19, 1950, by members of a University of Illinois herpetology class.

Paratypes. Thirty-two specimens as follows: **INHS 5684**, topotype collected March 6, 1951, by P. W. Smith; **CNHM 3266**, Meredosia, Morgan County, September, 1922, by A. C. Weed; **INHS 5768-76**, Chandlerville, Cass County, Illinois, by D. A. Langebartel and P. W. Smith; **INHS 5678-83**, **UIMNH 24034-9**, **UMMZ 103088(2)**, **CA 15685-6**, **CNHM 64654**, three miles east of Beardstown, Cass County, Illinois, taken. March 6, 1951, by P. W. and D. M. Smith; and **INHS 5685-9**, same locality, March 22, 1951, by M. W. Sanderson and P. W. Smith.

Diagnosis. A relict population of *Pseudacris streckeri* occurring in the Illinois sand areas, differing from western *P. streckeri* by the absence of yellow or orange-yellow groin color (in life), uniform distribution of pigment in the groin (in preserved-specimens), reduction of the lateral dark stripe (82 per cent have lateral stripe no greater in extent than the postorbital dark stripe; 50 per cent in *P. s. streckeri*), general pallid color, and smaller 5th row of labial teeth in the larvae.

Description of the type. Head broader than long; snout bluntly pointed; canthus rostralis rounded, loreal surface slightly -concave; eye one-half its vertical diameter above edge of lip, removed from snout tip by $1\frac{1}{3}$ its horizontal diameter; nostrils prominent, two-thirds distance from anterior edge of eye to snout tip; internasal distance equal to horizontal diameter of eye; vomerine teeth in two round patches, each slightly larger than choana, located between and slightly behind choanae; tympanum higher than wide, two-thirds size of orbit, nearer angle of jaws than orbit, posterior edge overlapped by vertical folds between angle of jaws and shoulder; supratympanic fold well developed; eyelids somewhat rugose; interorbital space with minute longitudinal ridges,



Holotype of *Pseudacris s. illinoensis*, new subspecies.

remainder of skin on head smooth; skin of dorsum and upper surfaces of legs smooth, becoming slightly irregular laterally; throat discolored and swollen; venter pustular, becoming granular posteriorly; proximal two-thirds of thighs granular, extending dorsad to level of vent on rear of thighs.

Forelegs short and stout; hands chubby; finger lengths in order of decreasing length 3, 2, 1, 4; a pair of pustules on posterior palmar region; webbing formula 3, 3-2.5, 3.3-3.3, 2.5; free flange of web along sides of each finger; digital pads smaller than penultimate phalanx; well developed tarsal fold; inner palmar pustule enlarged, outer barely visible; toe lengths in order of decreasing length, 4, 3, 5, 2, 1; webbing formula 2, 2-1.7, 3-2.5, 4-3.5, 2; digital pads smaller than penultimate phalanx; well developed free margin of web on sides of each toe.

Tibiotarsal articulation reaching middle of tympanum when legs are carried along sides of body; snout-vent length 38 mm.; head length 12 mm.; head width 14 mm.; femur length 15.5 mm.; tibia 16 mm.; foot 25 mm.

Ground color light gray with darker gray spot between canthi, dark gray, heavy V mark between the eyes, an inverted Y marking on each shoulder, the median prong of which breaks into series of small gray spots posteriorly; maxilla creamy white with suborbital dark spot; conspicuous slate colored marking arising on nostril, passing through eye, curving down to arm insertion, expanded behind orbit, enclosing all of tympanum; small blue-gray spot on proximal portion of anterior surface of humerus; series of small dark irregular marks on sides, especially pronounced just behind arm insertion and above groin; throat and pectoral region dark gray; venter and undersides of legs cream colored.

Comparisons. Living specimens of the two subspecies under consideration, still alive at the present writing, are separable by the absence of yellow and the uniform deposition of pigment in the groin of *illinoensis*; mottling of dark brown pigment concentrations and yellow in the groin of *streckeri*; the sharp contrast between ivory gray ground color and chestnut brown lateral stripe and vitta in the typical subspecies, and lack of contrast between pale ivory to dove gray ground color and dark gray or blue gray lateral spots and vitta in *illinoensis*. The leg bars of *P. s. streckeri* are more prominent, and the dorsal color is slightly more red-brown. Snout-vent lengths of *P. s. illinoensis* average a little longer than in *P. s. streckeri*. The dorsal pattern does not differ appreciably in the two subspecies.

The yellow groin color, when present, is constant in *P. s. streckeri*, whether chromatophores are expanded or contracted, but is somewhat more conspicuous on darkened specimens. Likewise, specimens of *P. s. illinoensis* are

constant in the absence of yellow in the groin whether dark or light. This color in the typical subspecies unfortunately quickly fades in preservative. The concentrations of pigment forming coarse reticulations in the groin of *streckeri* is evident in most preserved specimens, however, and provides the best character for separating dead specimens. Definite mottling is apparent in 70 per cent of the 48 Texas specimens available for comparison, absent or invisible because of poor preservation in the others. In *P. s. illinoensis* only 6 per cent of the 33 specimens might be regarded as having reticulate groins. The presence of yellow color and mottling may be correlated, but this is not certain since color is not apparent in preserved material.

Remarks. The occurrence of this species in the Illinois River sand areas approximately 450 miles northeast of the nearest published record of *P. s. streckeri* is at least surprising. It is remarkable, in view of the abundance of the species and its loud, very different call, that its occurrence in an area so intensively studied by zoologists could have gone undetected. The first specimen to reach a museum collection was CNHM 3266, collected in September, 1921, by A. C. Weed and mistakenly reported by him as *Pseudacris brachyphona* (1923, p. 49). Walker (1932, p. 382), resurrecting *brachyphona* as a valid species, examined this specimen and pronounced it "not *brachyphona*." The latter author recognized the specimen as *P. streckeri*, however, and he suggested to me the desirability of investigating the Meredosia area.

In May of 1950, members of the University of Illinois herpetology class secured a large male specimen on the wet highway three miles north of Meredosia. Subsequent trips to the area in 1950 yielded no additional specimens. In March of 1951, three trips were made to the area, and these frogs were heard calling each time at several localities in Cass and Morgan counties. On March 6, after the first day of temperatures above 70 degrees F., specimens were found in a small roadside pond three miles east of Beardstown. About midnight at an air temperature of 40 degrees F., males were in full chorus. The pond was little more than three feet in depth, filled with aquatic vegetation or submerged grass clumps, and bordered on one side by growths of willows, on the other by prairie. A few *P. nigrita* and *Hyla crucifer* were singing in the same pond, and a leopard frog and an *Ambystoma* were seen swimming in the water. Two female *P. streckeri* were collected, but no eggs were found. Males were clinging to clumps of grass in water six inches to two feet in depth. Calls of males appeared to stimulate nearby males to sing. Once disturbed, however, the dark brown frogs dived to the bottom but were easily seen in the clear water. The voice was a short, clear whistle uttered more rapidly than the call of *Hyla crucifer*. The call did not appear

different from that of Florida *P. ornata* and presumably does not differ from that of *P. s. streckeri*. A single male was found in a ditch in a pasture three miles north of Meredosia the same night.

On March 22, 1951, the Beardstown pond was visited again despite the fact that air temperature had dropped to 30 degrees and snow was falling. Males were calling and two clasping pairs were secured.

On March 29, an attempt was made to obtain specimens at other localities in the sand area. No specimens were heard north of Chandlerville near the Mason-Cass county line, although males were constantly heard between this locality and Beardstown 16 miles to the west. No egg masses or clasping pairs could be found, and the extreme wariness of singing males suggested the breeding peak was over.

Two females kept alive in the laboratory together deposited approximately 900 eggs which unfortunately were not fertilized by the clasping males. None of the eggs formed envelopes and all remained sticky to the touch. On May 18, Sherman Minton and I revisited the pond near Beardstown and dipped out numerous large larvae. The distinctive behavior of the tadpoles noted by Bragg (1942, p. 57) can be confirmed. The least disturbance sent larvae flitting to the bottom where they secreted themselves under algae and debris in a manner remarkable for a tadpole. Data on the living larvae extracted from my field notes are:

"Venter glistening white and opaque, head and thorax transparent with heart, gills, and teeth visible through the integument; sides of body with faint coppery tinge; dorsal fin arising approximately one eye diameter posterior to eyes, highly arched and hyaline; dorsal and ventral crests subequal, transparent, with dark tracery peripherally; tail translucent; hind limbs small; eyes protuberant, iris golden coppery; snout prolonged."

Preserved specimens killed on the day of capture were recorded as:

"Head and thorax transparent; mouthparts, gills, and heart visible from the side; belly black except medially where gray coils of intestine are visible through the peritoneum; strongly arched dorsal tail crest; dorsal crest at mid-tail slightly deeper than ventral crest; total length of largest tadpole 45 mm.; snout-vent length 17 mm.; average length of tadpoles approximately 38 mm."

Specimens kept alive in the laboratory for a week appeared quite different perhaps as a result of emaciation. The high arch of the dorsal crest proximally had been absorbed, the venter and thorax were silvery white and opaque, the internal organs no longer visible through the skin; and the jaw region and snout transparent.

Bragg's description (*loc. cit.*) of larval *P. streckeri* is far less adequate than his notes on behavior of the tadpoles. The numerous differences in mouth-

parts of *P. s. illinoensis* and his illustration of an Oklahoma specimen necessitated borrowing larvae of *P. s. streckeri* for direct comparison. The following discrepancies with Bragg's description should be pointed out. Each of the two segments of the second row of labial teeth extends laterally beyond the first row in 93 per cent of *P. s. illinoensis* and in all the *P. s. streckeri* examined. The median angulate process in the first row of teeth and the lateral junction of the third and fourth rows of labial teeth (as figured by Bragg) appear to be distortions, resulting from opening the mouth. Lateral junction of these rows was not found in any of the specimens examined. The restriction of papillae to sides, as illustrated by Bragg, was not duplicated in any of the specimens examined. The highly arched dorsal crest of freshly killed *P. s. illinoensis* has been mentioned; Bragg described the crest as not highly arched. This condition cannot be ascertained except in well preserved larvae, however, and the arch may differ in the two subspecies. A few slight differences in larvae appear to be useful in distinguishing the two races. The fifth row of labial teeth in *P. s. illinoensis* is usually less than two-thirds the length of either part of the second row of teeth, more than two-thirds in *P. s. streckeri*. Seven of eight *P. s. streckeri* larvae examined possess a short median diastema in the third row of teeth; all *P. s. illinoensis* have a continuous third row. Mouthparts of a typical *P. s. illinoensis* larva are shown in Figure 1.

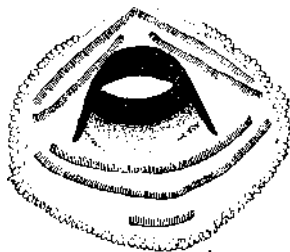


Figure Mouthparts of larval *Pseudacris s. illinoensis*.

Larvae kept in an aquarium transformed the last week of May and through early June. The dark interorbital marking appeared first, followed by the dorsal pattern, and both markings were distinct long before the tail had disappeared. Newly transformed frogs were 12 to 16 mm. in body length, dark gray with the darker gray- dorsal markings of the adults. The lateral spots and head stripes were indistinct until eight to ten days after the tail had disappeared, at which time the ground color was more coppery, the leg bars and lateral spots more pronounced.

Kinosternon flavescens spooneri, new subspecies*

Plate 2

Holotype. INHS 4244, female from Henderson County State Forest, 7 miles north of Oquawka, Illinois, collected June 9, 1949, by P. W. Smith.

Paratypes. Twenty-three as follows: INHS 4245, same data as holotype; INHS 3220-2, 2 miles south of Oquawka, Henderson County, Illinois, June 24, 1948, L. J. Stannard and P. W. Smith; INHS 5898, 6010-1, CA 15687, UMMZ 103089, Cimco Farms, 3 miles northeast of Havana, Mason County, Illinois, June 11, 1951, P. W. Smith; CNHM 37992-3, Snicarte Slough, Mason County, Illinois, C. H. Pope, May 31, 1941; INHS 5587-9, UIMNH 2252-6, USNM 83190, UMMZ 74654, Meredosia, Morgan County, Illinois, D. H. Thompson, June, 1927; INHS 5987-8, 1 mi. south Beardstown, Cass County, Illinois, P. W. Smith, June 21, 1951.

Diagnosis. A subspecies of *Kinosternon flavescens* occurring in relict populations on the Illinois sand prairies, differing from the typical subspecies by the black color of the soft parts, dark brown carapace, dark gray chin and neck with yellow restricted to the barbels and anterior half of the lower jaw, enlarged gular plate (51 per cent length of the anterior lobe of plastron; 41 per cent in *K. f. flavescens*^t), and larger size; differing from *K. f. stejnegeri* by the shorter femoral suture and smaller nuchal and gular plates (63 per cent anterior plastral lobe in *stejnegeri*).

Description of type. Carapace smooth, obtusely oval, and depressed; dark olive above with narrow black margins anterior to sutures; carapace length 110 mm., width 90 mm., greatest depth 54 mm.; 4th costals less than half size of anterior costals; 4th and 5th vertebrals subequal and slightly smaller than anterior vertebrals, 1st and 5th pentagonal, 2nd, 3rd, and 4th hexagonal; nuchal less than size of eye; marginals 2-7 and 11 subequal and shorter than marginals 1, 8, 9, and 10; 9th marginal more than twice height of 8th; axillary approximately $\frac{2}{3}$ size of inguinal; postinguinal on left side only.

*It is a pleasure to name this new turtle after my friend and former teacher, Dr. Charles S. Spooner, formerly head of the zoology department of Eastern Illinois State College, Charleston, Illinois.

^t Data from Hartweg, 1938, p 4.

Plastron 106 mm. in length, 72 mm. at greatest width; gular 21 mm. in length; interhumeral suture 15 mm.; pectoral suture 2 mm.; abdominal 26 mm.; interfemoral 3 mm.; anal 33 mm.; humeral plates rectangular, abdominals square, other plastral plates triangular; lateral processes of bridge deeply grooved longitudinally; posterior edge of plastron slightly notched; worn surfaces of plastron light horn color, remainder of plastron black.

Alveola of upper jaw one-third larger than that of lower jaw; lower mandible with projecting apex fitting into depression in alveola of upper jaw; top of head smooth and black with faint tinge of dark olive; sides of head dirty gray suffused with dull olive-yellow; a posterior dull yellow mark extending from rear edge of upper mandible posteroventrad; iris yellow above and below a black horizontal bar; chin and underside of neck gray suffused with dirty yellow; 4 pairs of barbels and anterior portion of lower mandible yellow; soft parts dark olive-gray, upper surfaces of head, legs, and tail black; feet strongly webbed, posterior free flange continuous with webs on each foot; front claws in order of decreasing size 2, 1, 3, 4, 5; hind claws 2, 1, 3, 4.

Comparisons. The dark soft parts and reduced amount of yellow on the neck and chin provide the easiest character for separating this subspecies from *K. f. flavescens*. Both features are more pronounced in living than in preserved specimens and apparently more marked in subadults than in extremely large specimens. Living specimens at hand from 79 to 110 mm. in carapace length are readily separable from Kansas and Texas turtles of corresponding sizes. The top of the head, legs, and tail are dull black in *K. spooneri*, yellow-gray to slate color in *K. f. flavescens*. The sides of the head are olive mottled with black, and the chin has a yellow tinge. Sides of the head, chin, and undersurfaces of the neck in living specimens from Kansas and Texas are immaculate light yellow. *K. f. flavescens* and *spooneri* are nevertheless more closely related than is either race to *K. f. stejnegeri* (see diagnosis). It is interesting to note, however, that the gular plate in *K. f. spooneri* is intermediate in size between Mexican *K. f. stejnegeri* and *K. flavescens* of western United States.

Variation. The largest example of *K. flavescens* in the comparative material available was an Oklahoma specimen with a carapace length of 135 mm. Almost one-third of the paratypes of *K. f. spooneri* exceed that length. Variation in the size of the gular plate of 18 paratypes is given in Table I. Data on five other paratypes are not tabulated because of damaged plates or their present unavailability.

Table I. Variation in Paratype *K. f. spooneri*.

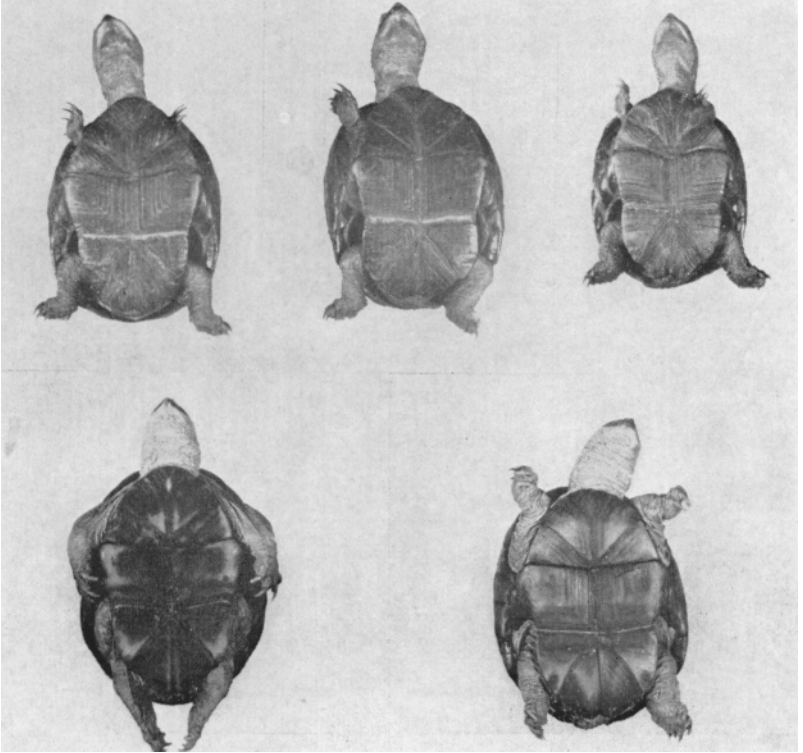
Museum	Number	Locality	Sex	Carapace Length	Gular Length	Interhumeral seam length	Gular length Ant. lobe length
INHS	5587	Morgan Co.	♂	142.0	22.0	20.0	52.0 per cent
"	5588	" "	♂	140.0	23.0	18.0	51.0 "
"	5589	" "	♂	138.0	?	19.5	?
UMNH	2252	" "	♂	145.5	20.2	19.0	49.4 per cent
"	2253	" "	♂	128.0	22.5	16.0	54.5 "
"	2254	" "	♂	140.0	21.0	21.2	47.7 "
"	2255	" "	♂	143.5	21.0	18.0	51.2 "
"	2256	" "	♂	132.0	20.0	19.0	52.5 "
INHS	4245	Henderson Co.	♀	119.0	23.0	19.0	54.8 "
"	3220	" "	?	70.0	13.0	12.5	48.2 "
"	3221	" "	?	61.0	10.5	11.2	50.0 "
"	6010	Mason Co.	♂	88.0	14.2	14.2	45.8 "
UMMZ	103089	" "	♀	79.0	14.5	13.0	53.7 "
CA	15687	" "	♀	83.5	15.8	15.0	51.0 "
INHS	6011	" "	♂	110.5	20.5	17.0	55.5 "
"	5989	" "	♀	100.0	18.5	17.0	53.6 "
"	5987	Cass Co.	♀	92.0	15.0	18.0	43.0 "
"	5988	" "	♀	93.0	15.0	16.0	45.5 "

Remarks. Cahn (1931, p. 120-123) first reported this species from localities between Meredosia and Peoria along the Illinois River. Smith (1948, p. 3) added the Oquawka sand area adjacent to the Mississippi River to the known range of the species. It is virtually a certainty that intergradation at present does not occur inasmuch as the nearest published record for the occurrence of the typical subspecies is Cherokee County, Kansas (Smith, 1950, p. 125). It seems preferable to regard the Illinois populations as a subspecies, however, in view of the probable past history of the species and the slight morphological differentiation.

Specimens taken over the past four years have all been collected in June. On two occasions DOR specimens have been found some distance from permanent water. Both times followed heavy rains. Specimens taken in the Oquawka region were in shallow, muddy sloughs adjacent to the river; specimens from Mason County were found in a small pond in the sand hills approximately three miles from the Illinois River. Those found in river sloughs were tracked by following the mussel-like furrows the foraging turtles plowed in the silty bottoms.

Two females collected June 9, 1949, were kept alive throughout the summer. Seven hard shelled eggs were deposited by one or both specimens during the third and fourth weeks of July. These symmetrically elliptical eggs ranged from 16 to 17 mm. in width and 28 to 29 mm. in length. Unfortunately all seven failed to develop.

Discussion. The two subspecies described herein are notable examples of animals whose present ranges suggest that more arid conditions prevailed in the Mid-West following the last glacial advance. The reduction in ranges of both species to relicts associated with sand prairie and removed from the Great Plains populations by a hiatus of three to four hundred miles contributes further evidence to the prairie peninsula hypothesis. The subspecific differentiation may have occurred with the geographical isolation which followed the xeric period or may have occurred earlier leaving the present populations as remnants of formerly widespread subspecies. The latter seems the more probable since one of the two, *K. spooneri*, is now known to occur in two separate sand areas, and both may be found in other sand prairies when these are more thoroughly investigated.



Ventral view of paratypic *Kinosternon f. spooneri* and *K. l. flavescens*. Upper row, INHS 5987-8 from Cass County, Illinois, and INHS 6011 from Mason County, Illinois: bottom row INHS 5952-3 from Morton County, Kansas

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